Work-related travel over the life course and its link to fertility

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Work-related travel over the life course and its link to fertility: a comparison between four European countries

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Abstract:	In contemporary societies, travelling intensively to and for work has become an important part in many people's lives. A life course approach suggests that spatial mobility may, however, conflict with other life domains such as fertility, especially for women. Using longitudinal survey data from France, Germany, Spain and Switzerland, our study provides novel evidence that the interdependence of fertility and work-related spatial mobility behaviours is largely shaped by national contexts. Based on innovative techniques of sequence analysis, our results indicate that long-term experiences of daily and weekly long-distance commuting and overnight work travel are associated with lower fertility mainly among women in Germany and Switzerland. In France and Spain, the association is weaker or absent. Interestingly, male overnight travellers in Germany and Switzerland show similar tendencies. These men have a comparatively lower fertility than other men, although the cross-national differences are less pronounced than among women. Our study discusses the role of national family policies, social norms and labour market structures in facilitating or hindering the reconciliation between fertility and work-related spatial mobility.

1. Introduction

Spatial mobility can both facilitate and challenge the combination of paid employment and parenthood. On the one hand, employed parents can travel long hours to coordinate spatially dispersed activities in work and family spheres. On the other hand, there are concerns that intensive travel to and for work is difficult to balance with childcare demands. Long-distance commuting, overnight business travel and work-related migration often reflect a strong commitment to work and require significant resources in time, money and energy that may conflict with parenthood. This difficult reconciliation is a critical issue for two main reasons. First, highly mobile workers may be deterred to have children, in a context of low and late fertility in many European societies (e.g. Kohler et al., 2002; Sobotka, 2004). Second, parents may face barriers in their career progression, since spatial mobility and flexibility play an important role in securing employment and enhancing occupational achievement in advanced capitalist societies (Callaghan, 1997; Ludwig-Mayerhofer and Behrend, 2014; van Ham, 2002).

In recent years, population studies have increasingly adopted a life course approach to investigate the relationship between migration and fertility (e.g. Huinink and Kohli, 2014; Kulu, 2008; Wingens et al., 2011). These studies have contributed to a better understanding of mobility and fertility behaviours as interrelated life trajectories. But longitudinal evidence is largely missing on the link between fertility and other forms of work-related mobility, such as long-distance commuting and overnight travel. We know very little about the fertility of people who have travelled extensively for work reasons for many years. The few cross-sectional or short-term longitudinal studies indicate that balancing work-related travel and parenthood is more difficult to achieve for women than for men (e.g. Rüger et al., 2011; Huinink and Feldhaus, 2012; Viry and Kaufmann, 2015). Evidence suggests that causality may run in both directions. Women who are spending long hours travelling to or for work are

less likely to become mothers than less-mobile employed women. Vice versa, (soon-to-be) mothers are more likely to reduce their work-related travel time to facilitate their participation in childcare and parenting. Because of traditional gender roles, households are likely to develop residential and work-related travel arrangements that reinforce a gendered division of labour.

However, existing studies are mostly based on single countries and overlook important cross-national differences, in particular in relation to work-family balance policies and gender roles. Thévenon (2011), and more recently Esping-Andersen and Billari (2015), argue that fertility is positively associated with policies and family norms that help reconcile careers with motherhood. The life course approach suggests that the interaction between mobility and fertility trajectories is largely shaped by the broader social context, historical time and place in which they unfold (Elder, 1994; Mayer, 2004). National cultures and structures, through social institutions and social policy, are likely to influence what is possible and seen as appropriate for men and women in their ways of combining work-related mobility and parenthood. In particular, reconciling motherhood and work-related travel may be more difficult in countries where childcare is considered to be a private matter and the main responsibility of mothers.

Using retrospective survey data from four European countries: France, Germany, Spain and Switzerland, this research addresses these knowledge gaps by studying how mobility experiences over men's and women's lives relate to their number of children and whether there are cross-country differences. We investigate various forms of spatial mobility, including labour migrants, daily and weekly long-distance commuters, and workers regularly absent from home. We conceptualise spatial mobility holistically as individual mobility histories, during which early mobility experiences may influence later experiences in the same or another form (see e.g. Müggenburg et al., 2015 about travel behaviours as life course

trajectory). We use innovative techniques of sequence analysis to grasp these mobility histories (Abbott and Tsay, 2000; Stovel and Bolan, 2004). Unlike several past studies, sequence analysis of complete mobility histories captures the role of both early and later mobility experiences in interacting with fertility. However, our analysis does not deal with the selection/unobserved heterogeneity issue that people who do not want children and those who are more career oriented might be more likely to travel long hours for work. In particular, our retrospective design did not allow us to examine people's past attitudes regarding career versus family orientation, which may have influenced both mobility and fertility behaviours (e.g. Huinink and Kohli, 2014).

The article contributes to the literature in three ways: (i) it adds long-term experiences of work-related travel (i.e. commuting and overnight travel) to longitudinal research on migration; (ii) it investigates individual mobility histories using sequence analysis; and (iii) it examines how national contexts influence the link between mobility histories and fertility in a cross-country comparison.

2. Work-related mobility and its link to fertility: the role of the national context

Work-related mobility and fertility

Some empirical evidence suggests that fertility is negatively associated with work-related long-distance mobility, with both directions of causality possible. Regarding the effect of fertility on migration, research has shown that childbirth reduces couples' willingness and chances of migrating for a job (e.g. Kulu, 2008). There is more limited evidence about long-distance commuting and overnight work travel. However, a growing body of evidence suggests that women decrease their work-related travel when they have children or in anticipation of starting a family. Using a cross-sectional design, Rüger et al. (2011) showed

that German women who had a partner and commuted an hour or more each way or made frequent overnight business trips were less likely to have children than both highly mobile men and employed women with shorter commutes. Using the same definition of mobility, and based on pooled data from six European countries, Rüger and Becker (2011) similarly demonstrated that the probability of having a child decreased with the frequency of mobility experiences only for women. These gender differences are in line with travel and housing research showing that households' residential and mobility arrangements tend to prioritise men's professional careers and women's domestic work (e.g. Crane, 2007; Turner and Niemeier, 1997). In particular, couples often seek to minimise the distance between home and the woman's workplace to facilitate her participation in housework and childcare.

In the other direction of causality, Huinink and Feldhaus' study (2012) provides some evidence that long-term travel experiences may hinder fertility for women in Germany. Using a three-wave panel study, they showed that female long- and medium-distance commuters (home-to-work trips of at least 30 minutes) did not differ from less mobile women as to their fertility intentions, but as to the likelihood of realising them. For men, non-realised fertility intentions could only be observed among those who recently started having long commutes, but not among those who commuted long distances for years. The negative impact of work-related mobility on fertility can already lie in barriers to marital stability. Recent evidence from central and northern Europe suggests that frequent long-distance moves (Boyle et al., 2008) and long-distance commutes (Kley, 2012; Sandow, 2014; Viry and Kaufmann, 2015) are associated with a higher risk of union dissolution. This literature suggests that three factors may contribute to increased tensions and resentments between partners: (i) the commuting stress; (ii) men primarily benefit from mobility arrangements and (iii) highly mobile women challenge traditional gender roles.

There is also reason to think that long-term experiences of mobility are positively associated with fertility in some situations. Parents can decide to commute instead of relocating to maintain the family unit in its familiar environment, for example when grandparents live nearby (Green et al., 1999). When the workplace is too far away for daily commuting, some households may choose a living arrangement where one parent, usually the father, makes regular overnight trips and spends part of the week away from the family (e.g. van der Klis and Mulder, 2008). In metropolitan areas, living in a place that is suitable for large families often requires long-distance commuting because of high house prices in central areas. In turn, work-related mobility may contribute to higher fertility if mobility facilitates the accumulation of (financial) resources that enable the desire for starting a family (e.g. Huinink and Feldhaus, 2012).

Finally, we can also expect that there is no association between fertility and work-related mobility. One reason is that negative and positive associations discussed above counterbalance each other. Another reason is that individuals and households develop coping strategies and rely on resources that enable them to combine work-related mobility with having a family. This may be the case for highly mobile fathers in households with a traditional division of labour. But this can also be true for dual-career couples with many resources available, such as access to and money for childcare provision or support network.

Cross-country differences in the relationship between fertility and work-related mobility

Prevailing family norms within a given country may influence how people balance fertility and work-related mobility. In some societies more than in others, parents – and especially mothers – may feel guilty when they are regularly absent from home due to employment (e.g. Ruckdeschel, 2009). The image of the 'good parent' may conflict with time spent travelling for work, through informal sanctions and internalised dispositions. Attitudes towards highly

mobile parents may strongly differ for men and women, as meanings given to both parenthood and mobility are clearly differentiated by gender (Uteng and Cresswell, 2008). Spending a great deal of time travelling for work might be more socially accepted for fathers than for mothers in societies with traditional values towards gender roles (Schneider and Meil, 2008). These cultural scripts and social norms are interrelated with family institutions. Active family policies, the provision of childcare services and tax regulations to facilitate dual-earner couples can help employed parents, especially mothers, to deal with work-related mobility. In conservative regimes such as Germany, but also in familialist regimes such as Spain, traditional gender roles are comparatively strong (Esping-Andersen and Billari, 2015; Thévenon, 2011). This is also the case in Switzerland, which can be characterised as a liberal regime with low government intervention and where families are mainly regarded as a private matter (Fux, 2002). In these countries, the reconciliation of parenthood and work-related mobility can be especially difficult for women. In France, by contrast, family policies and the well-developed provision of childcare services may facilitate mothers' work-related mobility. However, the lack of public childcare services may also favour parents' long-term mobility, when informal childcare by grandparents and neighbours encourages working parents to commute instead of relocating. The regular help of grandparents in informal childcare in Spain and, to a lower extent, in Switzerland, compared to France and Germany (Igel and Szydlik, 2011), could be conducive to daily long-distance commuting in these countries.

National housing and labour markets can also strongly influence parents' travel decisions and behaviours (e.g. Haas and Osland, 2014). In particular, parents' long-distance commuting may result from the lack of jobs in the residential area or the lack of affordable housing close to inner-city jobs. The cost of living in Spanish and French metropolitan areas may encourage low and modest-income parents' long-distance commuting in these two countries. Moreover, lower salaries and higher unemployment rates in Spain and France than in Germany and Switzerland may push parents to be highly mobile to have two (full-time) jobs to make a

living (Ravalet et al., 2015). Dual-earner couples are also more likely to commute further to combine two workplaces with one residential location (Green, 1997). Economic necessity may play an especially important role in Spain where there is a 'strong fiscal lever encouraging parents to combine work and family life' (Thévenon, 2011: 71). Moreover, the higher home ownership rates in Spain and France, compared to Germany and Switzerland, may incite employed parents to commute instead of relocating. But on the other hand, the federal political system in Germany and Switzerland with regional school systems and childcare services may discourage parents to move between regions and may favour inter-region commuting (Kaufmann, 2008). The effect of transport infrastructures and policies remains unclear. Well-developed and dense transport systems, like in Germany and Switzerland, may help parents reconcile long-distance travel and family demands by reducing travel time, and the level of stress and energy use. But when mobility is measured in terms of travel time (like in this study) parents' long commutes to work may result from poor transport infrastructure.

Hypotheses

The literature and cross-country differences discussed above suggest the following expectations:

(i) In Germany and Switzerland, we expect that women with long experiences of work-related mobility have lower than average fertility, because both countries are characterised by traditional family norms and policies and low levels of public childcare provision. We expect a weak or no association among highly mobile women in France, with a well-developed provision of childcare services and a tendency for gender-egalitarian norms. Women in Spain are expected to lie in-between these two situations. On the one hand, the familialist regime may support lower fertility among

highly mobile women, but, on the other, high economic pressure on the labour market and high shares of informal and private childcare may encourage mothers' long commutes.

(ii) Among men with long experiences of work-related mobility, we expect an average or slightly above average fertility in all countries, because fertility and work-related mobility are not conflicting life domains.

From (i) and (ii), we expect (iii) larger cross-national differences among women than among men, because national structures and norms promoting dual-earner couples are expected to be important in mitigating women's conflict between fertility and work-related mobility.

3. Methods

Data

The data were derived from the second wave of the 'Job Mobilities and Family Lives in Europe' study (Rüger et al., 2016; doi: 10.4232/1.12644). Respondents were randomly selected from the residential population in France, Germany, Spain and Switzerland in 2007 and re-interviewed in 2010/11 using a panel design (response rate 34.5%). Highly mobile people were oversampled in the 2007 survey to obtain a broader empirical basis. We used weights to correct for panel attrition, non-response bias and research design (i.e. oversampling of highly mobile individuals). Among the participants of the 2007 survey, younger respondents and those who moved to another region or country for work-related reasons between 2004 and 2007 were less likely to participate in the 2010/11 survey, probably due to a higher probability of relocating between the two waves. Workers travelling long hours to and for work (i.e. long-distance commuters and overnight business travellers) were not more likely to drop out than less-mobile participants, except in France. The dataset includes

retrospective information about work-related travel experiences of 1,735 individuals aged 28 to 59. The present study was restricted to respondents aged 40 or older at the time of the second interview (N=1,064; 48.9% women) with mostly completed fertility. Country subsamples were adjusted to identical sample sizes (see Rüger et al., 2016).

Analysis

The analysis consisted of three steps. First, we performed sequence analysis and cluster analysis to identify six patterns of mobility histories. Analysis was conducted for men and women together to obtain the same patterns of mobility histories and thereby ensure full comparability between genders. Using the above classification, a post-hoc sequence visualisation conducted separately on men and women confirmed that the six patterns of mobility histories were similar for men and women. Past and present mobility experiences in various forms were operationalised as mobility histories. A holistic approach is particularly appropriate for this study, as mobility experiences are likely to have long-term impact on family development and fertility (and vice versa). Respondents were asked about their current and past jobs of at least one year's duration since the age of 15. For each job reported, they were asked to indicate the start and end year, and whether they were highly mobile in one or several forms for this job. Mobility histories were composed of seven possible states: (1) non-employed (including full-time education, unemployment, parental leave); (2) employed, no mobility; (3) daily long-distance commuting, i.e. home-to-work trips of more than one hour; (4) overnight work travel, i.e. people who spent at least 60 nights a year away from the (main) home for work-related reasons, e.g. frequent overnight business trips to various destinations, weekly or monthly commuters with a primary and secondary residence, 'mobile jobs' like lorry drivers or flight attendants; (5) migration, i.e. people who moved for their job over a distance of more than 50 km or across national boundaries; (6) combination of daily long-

distance commuting/overnight business travel; (7) combination of migration/daily long-distance commuting or overnight business travel.

The TraMineR package for the statistical environment R was used to visualise and analyse sequences (Gabadinho et al., 2009). We used optimal matching analysis (OMA) to group together similar sequences (Stovel and Bolan, 2004). Optimal matching algorithms determine the dissimilarity (or distance) between two sequences by minimizing the 'cost' of transforming one sequence into the other, in terms of insertions, deletions and substitutions of states. The cost of substituting a state with another was fixed to 2. It is a rule of thumb to fix the cost of inserting/deleting one state slightly higher than the highest substitution cost. The insertion/deletion cost was then fixed to 3. Other cost schemes were tested (e.g. weighing up differences between non-mobile and mobile states) and finally rejected, because they led to less clearly interpretable groupings and lower partition quality indices (see below). Based on distances between the sequences, we used a weighted cluster analysis (PAM algorithm) to form types of mobility histories (Studer, 2013). We trimmed sequences at age 50. The goal was to find a compromise between having a sufficient number of years to identify common patterns of mobility histories, also after childbirth, and reducing the variation in sequence length to avoid grouping by length. We compared the quality of the partition with different numbers of groups by a series of indices summarised in Studer (2013: 12-19). We identified a six-group partition as the best solution.

In the second step, we described the types of mobility histories by socio-demographic variables and by several fertility and spatial mobility indicators. Analyses were performed separately for men and women to examine possible gender differences.

Finally, we analysed the association between mobility histories and fertility. We estimated regression models for men and women separately using the number of children as dependent variable and mobility histories as independent variable (see e.g. Svensson et al., 2015 for a similar approach using sequence analysis). Because fertility may directly influence mobility

experiences (see previous section), these latter regression models cannot be regarded as strictly causal, but as a way to test the strength of the relationship between mobility histories and fertility. In particular, childbirths may occur at the beginning of the mobility history, arguing for a reverse direction of causality. We ran Poisson regressions since our dependent variable represents count data and calculated robust standard errors to account for the complex structure of the data. We controlled for age (in years), educational attainment in three categories: lower-level secondary or less (ISCED 0-2), upper-level secondary (ISCED 3-4), tertiary or more (ISCED 5-6) (reference category) and country of residence (reference category: Germany). We ran a second regression analysis including interaction terms between the country of residence and mobility histories to statistically test whether the national context moderates the relationship between mobility history and the number of children.

We performed additional analysis to test and further clarify the results. First, we estimated country-specific models to analyse the direction of the relationship between mobility histories and number of children within each country (see Tables A5 and A6 in the Appendix). Second, we fitted two additional regression models to better characterise the fertility situation (not shown). In the first model, we used parenthood (yes/no) as the dependent variable to identify whether differences in the number of children possibly reflect differences in the probability of being a parent. In the second model, we focused on parents only and included age at first birth as a further independent variable. Results from these additional models are mentioned where relevant.

4. Results

Mobility histories

The quality measures of the PAM cluster analysis suggested a six-cluster solution as optimal to group mobility histories into typical patterns. Figure 1 displays the six patterns for men and

women together as state distribution plot for ages 15 to 50 years. This graphical representation shows the frequency of each state (i.e. daily long-distance commuting) by age. Figure A2 (supplementary file online) additionally shows individual sequences grouped by patterns.

Place Figure 1 about here

Two of the six patterns are clearly identified as long-term mobility experiences: History 2 (daily long-distance commuting) and History 5 (overnight work travel). Overall, the distribution of the six mobility patterns varies moderately across countries (V=.128; p<.001). In particular, History 2, 'Daily long-distance commuters', is fairly equally represented in the six countries (4.4%-6.3%). History 5, 'Overnight travellers', is less common in Spain (1.3% vs. 4.3% among all countries).

Tables 1 and 2 provide a description of the six patterns of mobility histories based on socio-demographic, fertility and spatial mobility indicators, separately for men and women. The first pattern, 'Early employment non-mobile' (27.8% in the full sample; 41.0% women), consists of individuals who enter the labour market early and have a stable career but little experience of work-related mobility (average duration of 2.60 years for men and 1.29 for women). For some individuals, a mobility episode occurs at the beginning of their career, sometimes in the form of migration, but stops after a few years. Most of these respondents are parents, and predominantly with two children. Compared with other patterns (especially History 3) these men and women are older on average and less educated.

Table 1: Description of mobility history patterns – men

	1. Early employment non-mobile (32.0%)	2. Daily long-distance commuters (7.4%)	3. Late employment non-mobile (31.3%)	4. Non-employed (2.8%)	5. Overnight travellers (7.4%)	6. Late and unstable employment (19.1%)	Total	Coefficients (p)
Sociodemographics								

Age (mean)	51.3	48.8	49.1	48.8	48.5	44.3	48.8	Eta=.459***
Education (% tertiary)	12.1	14.6	28.2	33.3	29.3	32.7	23.1	V=.206***
Net household income (Euros) by consumption unit (mean) [c]	2,025	2,261	2,306	1,149	2,399	2,119	2,152	Eta=.149+
Stable relationship (%)[c]	86.7	77.5	91.1	75.5	80.5	78.8	85.1	V=.150*
Age at first job (mean)	17.73	20.90	22.08	25.14	20.77	24.67	21.05	V=.582***
Years of non-employment since first job (mean)	1.45	1.42	0.81	10.07	1.15	2.78	1.72	Eta=.774***
Number of employers in the job career (mean)	3.93	4.33	4.12	9.21	3.11	5.54	4.39	V=.234***
Fertility indicators								
Parents (%)	90.1	87.5	88.8	66.7	78.0	68.3	83.8	V=.240***
Age at first birth (mean)[a]	27.8	30.3	30.4	28.4	27.6	29.7	29.2	Eta=.231***
Number of children (mean)[b]	1.95	1.85	1.78	1.34	1.58	1.43	1.75	Eta=.202***
Mobility indicators								
Years of daily long distance commuting (mean)	0.88	19.80	0.57	0.88	0.78	1.17	2.23	Eta=.872***
Years of overnight work travel (mean)	0.95	0.20	0.71	0.73	20.18	0.78	2.21	Eta=.865***
Years of migration (mean)	0.16	0.15	0.33	0.08	0.17	0.26	0.23	Eta=.141+
Years of high mobility (all forms) (mean)	2.60	22.01	2.14	3.19	22.81	3.15	5.55	Eta=.832***

Notes: [a] only parents; [b] all respondents; [c] at time of survey; [d] only employed persons; + p<.10 * p < .05 ** p < .01 *** p < .001; weighted data; N = 544

In the second pattern, 'Daily long-distance commuters' (5.8% in the full sample; 35.5% women), people commute at least 60 minutes each way from home to work throughout most of their career (average duration of 19.80 years for men and 19.99 for women). While, among men, only 14.6% have a tertiary education, educational level among women is comparatively high (36.4% tertiary education). Women in this category have the highest household income among the female sample. Most men within this pattern are fathers, predominantly with two children. In contrast, the proportion of mothers is comparatively low (72.7% against 86.9% for all women). Moreover, women in this category have fewer children (1.28 against 1.83 for

all women). Mean age at first birth is comparatively high for fathers (30.3 years) and low for mothers (25.7).

Table 2: Description of mobility history patterns – women

	1. Early employment non-mobile (23.2%)	2. Daily long-distance commuters (4.2%)	3. Late employment non-mobile (28.6%)	4. Non-employed (20.2%)	5. Overnight travellers (1.1%)	6. Late and unstable employment (22.6%)	Total	Coefficients (p)
Sociodemographics								
Age (mean)	51.5	50.1	48.6	48.2	45.8	45.6	48.5	Eta=.401***
Education (% tertiary)	7.5	36.4	37.6	17.1	33.3	39.3	26.8	V=.301***
Net household income (Euros) by consumption unit (mean) [c]	1,816	2,371	2,029	1,414	2,144	1,891	1,837	Eta=.204**
Stable relationship (%)[c]	72.7	81.8	82.4	85.7	60.0	84.6	81.1	V=.136+
Age at first job (mean)	17.94	20.75	22.19	22.20	22.78	23.75	21.49	V=.399***
Years of non-employment since first job (mean)	3.22	1.48	2.13	16.20	2.05	4.79	5.80	Eta=.690***
Number of employers in the job career (mean)	4.22	4.74	3.54	5.53	4.49	3.92	4.11	Eta=.214**
Fertility indicators								
Parents (%)	87.6	72.7	84.5	94.3	83.3	85.5	86.9	V=.139+
Age at first birth (mean)[a]	26.3	25.7	27.3	25.1	26.9	27.0	26.4	Eta=.155+
Number of children (mean)[b]	1.84	1.28	1.60	2.29	1.59	1.84	1.83	Eta=.230***
Mobility indicators								
Years of daily long distance commuting (mean)	0.79	19.99	1.15	1.38	0.19	0.69	1.80	Eta=.775***
Years of overnight work travel (mean)	0.20	0.06	0.22	0.49	15.84	0.40	0.47	Eta=.759***
Years of migration (mean)	0.21	0.01	0.28	0.10	0.24	0.34	0.23	Eta=.150*
Years of high mobility (all forms) (mean)	1.29	21.93	1.77	2.43	17.23	1.61	2.78	Eta=.782***

Notes: [a] only parents; [b] all respondents; [c] at time of survey; [d] only employed persons; + p<.10 * p < .05 ** p < .01 *** p < .001; weighted data; N = 520

Respondents grouped in the third pattern, 'Late employment non-mobile' (29.9% in the full sample; 46.5% women), are similar to the first pattern in terms of mobility: they have little mobility experience over their career (average duration of 2.14 years for men and 1.77 for

women). Yet, compared to the other patterns, they more often experience migration, mostly in their 20s. In contrast to the first pattern, these men and women are highly educated, enter the labour market later and have a higher average net household income. Among men, fertility behaviours are similar to the first pattern, with a comparatively high proportion of fathers and high average number of children. Among women, in contrast, fertility is marked by a comparatively low average number of children (1.60). Both fathers and mothers within this pattern have their first child comparatively late.

The fourth pattern, 'Non-employed' is a typically female pattern (11.3% in the full sample; 87.5% women) characterised by long periods of non-employment and interrupted careers. Some individuals of this category practise high mobility (average duration of 3.19 years among men and 2.43 among women). The average household income is the lowest of all patterns for both men and women. Men and women in this category significantly differ in their socio-demographic characteristics and their fertility behaviours. The educational level is high among men and low among women. Contrary to their female counterparts, men are more likely to have no stable partner (24.5% against 14.3% for women) and no children (33.3% against 5.7% for women). Moreover, while women have the highest average number of children (2.29) among all patterns, men have the lowest one (1.34).

The fifth pattern, 'Overnight travellers' is a typically male pattern (4.3% in the full sample; 13.0% women). In this category, people have a job requiring frequent nights away from home throughout most of their career (average duration of 20.18 years among men; 15.84 years among women). The proportion of fathers is low compared with the other patterns (78.0% against 84% for the whole sample), but those who are fathers have their first child early (mean age of 27.6). Women in this category are rather average in this respect (83.3% of motherhood

and age at first child of 26.9). However, the average number of children is among the lowest of all patterns for both men (1.58) and women (1.59).

Respondents grouped in the sixth pattern, 'Late and unstable employment' (20.9% in the full sample; 53.2% women), have the most complex and most heterogeneous mobility histories (average mobility duration of 3.15 years for men and 1.61 for women). Both men and women in this category are younger, better educated and enter into the labour market at a later age than the rest of the sample. Mobility histories among men are characterised by a comparatively high level of career instability. Men in this category reported both the highest average number of employers in the job career and the highest number of years of non-employment after the start of the first job (except 'Non-employed') among men. These differences are less marked among women. For men, the instability of mobility histories is associated with one of the lowest and latest fertility compared with other patterns: only 68.3% are fathers, the mean age at first birth is 29.7 and the average number of children is 1.43. In contrast to men, women in this category do not significantly differ from other women in their fertility behaviours.

Overall, the results reveal that long-lasting mobility experiences among women are relatively scarce. History 2, 'Daily long-distance commuters', and especially History 5, 'Overnight travellers', are predominant among men. While men and women of these two groups differ little in terms of mobility indicators, there are some important differences with respect to socio-demographic characteristics and fertility behaviours. This latter point will be further addressed in the following regression analysis.

Regressions

Tables 3 and 4 show results from Poisson regressions. We estimate the association between the number of children and the patterns of mobility histories, separately for men (Table 3) and women (Table 4). The tables present two models. Model 1 controls for age, educational level and country of residence (Germany as reference category). Model 2 additionally includes interactions between the country of residence and patterns of mobility histories. There are no cases of female 'Overnight travellers' (History 5) in the Spanish sample, so this category is excluded from Model 2. The models for men do not converge when the pattern 'Non-employed' (History 4) is included, so we exclude the few cases of this category. Since we use effect coding for mobility histories, the reference category is the average (unweighted mean) of all patterns. The exponentiated coefficient represents the ratio between the expected number of children for a given pattern and the reference category. In the interaction models (Model 2), the reference category is this ratio in Germany. A significant coefficient of the interaction term suggests that the effect of a given pattern in a given country is significantly different from the effect in Germany. For robustness checks, we also estimate models using dummy coding with History 1 'Early employment non-mobile' and History 3 'Late employment non-mobile' as reference category (not shown). As these two categories are characterised by uninterrupted employment histories, the goal is to measure the effect of long-term mobility experiences free from the confounding effects of employment. The main results do not differ from models with effect coding.

Table 3: Poisson regressions of number of children on mobility history – men

	Model 1		Model 2	
	Exp(B)	p	Exp(B)	p
Mobility history (ref.=mean)				
History 1 'Early employment non-mobile'	**1.163**	**0.005**	**1.236**	**0.015**
History 2 'Long-distance commuters'	1.086	0.301	1.003	0.984
History 3 'Late employment non-mobile'	1.019	0.676	1.030	0.806
History 4 'Non-employed'	a	a	a	a
History 5 'Overnight travellers'	**0.853**	**0.049**	0.792	0.164

History 6 'Late and unstable employment'	0.932	0.347	0.988	0.932
Country (ref.=Germany)				
France	1.124	0.091	**1.235**	**0.012**
Spain	0.950	0.512	1.078	0.497
Switzerland	0.981	0.780	0.981	0.840
Educational level (ref.= tertiary or more)				
Lower secondary or less	0.928	0.266	0.947	0.431
Upper secondary	0.959	0.578	0.974	0.741
Age (years)	**1.016**	**0.004**	**1.016**	**0.004**
History 1 * France			0.839	0.100
History 1 * Spain			0.809	0.117
History 1 * Switzerland			0.986	0.785
History 2 * France			1.328	0.141
History 2 * Spain			1.234	0.558
History 2 * Switzerland			0.916	0.684
History 3 * France			0.901	0.469
History 3 * Spain			0.927	0.616
History 3 * Switzerland			1.083	0.597
History 4 * France			a	a
History 4 * Spain			a	a
History 4 * Switzerland			a	a
History 5 * France			1.145	0.493
History 5 * Spain			1.245	0.275
History 5 * Switzerland			0.959	0.865
History 6 * France			0.870	0.449
History 6 * Spain			0.869	0.446
History 6 * Switzerland			1.086	0.683
Constant	0.811	0.465	0.753	0.333
LR chi² (df) / prob > chi²	**20.820(10)/0.022**		25.390(22)/0.279	
AIC/BIC	1487.727/ 1534.109		1507.157/ 1604.139	
N	501		501	

Notes: Log-link; robust standard errors; weighted data; a= excluded due to low case numbers; bold face coefficients are significant at p<.05

Results of Model 1 for men indicate that the estimated number of children for History 5 'Overnight travellers' is 0.85 times lower (p<.05) as compared to all patterns of mobility histories. The country-specific models (see Table A5 in Appendix) show that this association is mainly found among men living in Germany and Switzerland, although the results are not statistically significant. In contrast with 'Overnight travellers', Model 1 shows that male 'Daily long-distance commuters' (History 2) do not have a significantly different number of children than average. Men in History 1 'Early employment non-mobile' have a significantly higher number of children. The country-specific models show that this latter effect is

significant for men living in Germany and Switzerland, but not for men living in France and Spain. However, Model 2 indicates that these differences between countries are not statistically significant. The country-specific models further show that 'Daily long-distance commuters' in France have a significantly higher number of children than average and there is a similar tendency in Spain (although not statistically significant) but not in Germany and Switzerland. Model 2 indicates that these country differences are not statistically significant when Germany is set as the reference category. Additional analysis reveals that the difference between France and Switzerland regarding 'Daily long-distance commuters' is statistically significant (exp(B)=1.448; $p<.05$) when this latter country is set as reference category (not shown).

Table 4: Poisson regressions of number of children on mobility history – women

	Model 1		Model 2	
	Exp(B)	p	Exp(B)	p
Mobility history (ref.=mean)				
History 1 'Early employment non-mobile'	1.060	0.388	1.221	0.081
History 2 'Long-distance commuters'	**0.732**	**0.023**	**0.497**	**0.035**
History 3 'Late employment non-mobile'	0.922	0.181	0.973	0.835
History 4 'Non-employed'	**1.414**	**0.000**	**1.978**	**0.000**
History 5 'Overnight travellers'	0.891	0.409	**0.737**	**0.000**
History 6 'Late and unstable employment'	1.109	0.120	1.161	0.371
Country (ref.=Germany)				
France	1.097	0.321	**1.299**	**0.012**
Spain	0.994	0.956	1.243	0.054
Switzerland	0.977	0.811	1.095	0.387
Educational level (ref.= tertiary or more)				
Lower secondary or less	0.929	0.355	0.939	0.444
Upper secondary	0.958	0.586	0.947	0.493
Age (years)	1.010	0.163	1.012	0.104
History 1 * France			0.791	0.083
History 1 * Spain			0.964	0.698
History 1 * Switzerland			0.878	0.401
History 2 * France			1.489	0.303
History 2 * Spain			**2.496**	**0.006**
History 2 * Switzerland			1.207	0.571
History 3 * France			0.975	0.866
History 3 * Spain			0.934	0.680
History 3 * Switzerland			0.940	0.727
History 4 * France			**0.633**	**0.022**

History 4 * Spain			**0.580**	**0.007**
History 4 * Switzerland			0.742	0.119
History 5 * France			**1.376**	**0.003**
History 5 * Spain			a	a
History 5 * Switzerland			1.319	0.289
History 6 * France			0.999	0.997
History 6 * Spain			0.782	0.235
History 6 * Switzerland			1.025	0.534
Constant	1.065	0.850	0.867	0.667
LR chi² (df) / prob > chi²	**27.715(11)/0.004**		**39.209(25)/0.035**	
AIC/BIC	1493.458/1543.417		1509.963/1618.209	
N	475		475	

Notes: Log-link; robust standard errors; weighted data; a= excluded due to low case numbers; bold face coefficients are significant at p<.05

Results of Model 1 for women show that the estimated number of children is 0.73 times lower for History 2 'Daily long-distance commuters' (p<.05) and 1.41 times higher for History 4 'Non-employed' (p<.001) than average. In contrast with 'Daily long-distance commuters', female 'Overnight travellers' do not have a significantly lower number of children than average.

Model 2 indicates that this latter effect is moderated by the national context. The relationship between female 'Overnight travellers' (History 5) and the number of children differs significantly between Germany (reference category) and France (exp(B)=1.376; p<.01). Country-specific models (see Table A6 in Appendix) indicate that female 'Overnight travellers' in Germany have a significantly lower number of children than average, while this is not the case in France. The situation of female 'Overnight travellers' in Switzerland is similar to the situation in Germany. They tend to have fewer children than those in other patterns (exp(B)=0.740; p<.10), although this effect is not statistically different from that in France when Switzerland is used as reference category in Model 2.

Model 2 and country-specific models for women also show cross-national differences for 'Daily long-distance commuters' (History 2). While female 'Daily long-distance commuters' in Germany and Switzerland have a lower number of children compared to other patterns of mobility histories, female 'Daily long-distance commuters' in Spain tend to have an above-

average number of children (p<.10). Model 2 indicates that the difference between Germany (reference category) and Spain is statistically significant (exp(B)=2.496; p<.001). The difference is also significant when Switzerland is used as reference category (exp(B)=1.956; p<.001). The country-specific model in France shows that there is also a negative effect (p<.10) between long-distance commuting and the number of children among women. However, Model 2 indicates that this effect is not statistically different from that in the other countries. Finally, Model 2 shows that the positive association between non-employment and fertility is significantly stronger in Germany than in France and Spain.

Logistic regressions using parenthood (yes/no) as dependent variable (not shown) reveal that the lower number of children among female 'Daily long-distance commuters' in Germany and, more moderately, in France reflect a lower probability of motherhood rather than fewer children among mothers. In contrast, female 'Overnight travellers' in Germany are more likely to be mothers with fewer children rather than being without children. In Switzerland, female 'Daily long-distance commuters' and female 'Overnight travellers' tend to be mothers as often as less-mobile women but they have fewer children. The lower number of children among male 'Overnight travellers' (predominantly in Germany and Switzerland) mainly concerns men without children rather than fathers with fewer children.

5. Discussion

Using longitudinal data from four western European countries: France, Germany, Spain and Switzerland, this study is the first to analyse the interrelationship between fertility and work-related spatial mobility in a cross-national context. Using a life course approach, we assumed that this interrelationship unfolds throughout the lives of men and women and is shaped by national cultures and structures (Huinink and Kohli, 2014). We conceptualised various forms of mobility experiences as life trajectories, including long-distance commuting and overnight

work travel to expand on existing longitudinal research on migration. Sequence analysis provided an innovative and dynamic method to explore mobility behaviours over people's lives. We expected that long experiences of work-related spatial mobility are associated with lower fertility among women in Germany and Switzerland, mainly due to traditional family norms and policies, and low levels of public childcare provision. By contrast, we expected a weak or no association among women in France and Spain and no or a positive association among men in all countries.

Results show that a significant proportion of the population in the four countries studied are travelling long hours to and for work throughout most of their careers: about 15% among men and 5% among women. These mobility histories are associated with fewer children among women. As expected, this association is mainly found among women living in Germany and Switzerland, for both long-distance commuters and overnight business travellers. The association is largely absent among women living in France and Spain, although female daily long-distance commuters in France have also fewer children than other French women. Interestingly, there are similar tendencies among male overnight travellers in Germany and Switzerland. These men have a comparatively lower fertility, although the differences with France and Spain are less pronounced than in the case of women. Confirming existing evidence from cross-sectional studies that highly mobile women are more likely to be without children in Germany (e.g. Rüger et al., 2011), our results adds further evidence that long-term travel experiences are related to having fewer children among women in Switzerland. Moreover, they nuance existing evidence establishing effects for women only. Finally, our study provides novel evidence that the national context significantly shapes the interdependence of work-related spatial mobility and fertility behaviours over people's lives.

Our findings can be interpreted in light of cross-national differences in social norms, family policies, spatial organisation and labour market structure. In France, family policy regimes and the well-developed provision of public childcare services may help women reconcile

parenthood and work-related spatial mobility. Conversely, the combination between motherhood and work-related spatial mobility may be more difficult in Germany, Spain and Switzerland, where traditional norms of parenthood and conservative family policies are more strongly entrenched than in France. The lower fertility among male overnight travellers, which is especially observed in Germany and Switzerland, however, suggests that fewer children among highly mobile women in these two countries cannot be solely attributed to more gendered mobility arrangements within couples. Rather, we speculate that limited childcare provisions and traditional norms regarding parenthood (e.g. feeling guilty to be away from home) discourage women and some men in Germany and Switzerland to combine work-related spatial mobility and parenthood. Favourable economic conditions in these two countries may also enable parents to reduce their mobility in countries with high expectations regarding parenthood. Finally, it may be that highly mobile workers in Germany and Switzerland want to have fewer children. This view is however challenged by a recent study from Germany showing that employees with longer commutes did not differ from non-mobile employees regarding their fertility intentions, but regarding the likelihood of realising them (Huinink and Feldhaus, 2012). This effect was particularly strong in the case of female long-distance commuters.

The above-average fertility among female daily long-distance commuters in Spain was unexpected. Two reasons may account for this finding. Firstly, higher economic pressure on the labour market and the lack of affordable housing in central urban areas may force a comparatively large number of parents in Spain to be highly mobile. Secondly, the cultural importance of living in close spatial proximity to family members in Spain may encourage parents to commute rather than relocate. Informal grandchild care may offer more flexible arrangements for balancing work-related mobility and family. Nevertheless, there seem to be strong normative expectations in Spain against mothers' regular overnight travel insofar as this pattern does hardly exist in this country. Overall, our results suggest a complex interplay

between cultures and structures that facilitate, hinder or require the reconciliation between fertility and work-related spatial mobility. Further research is needed to disentangle these aspects.

The study has some limitations. Firstly, it uses an exploratory approach based on sequence analysis which does not enable causal interpretations. In particular, we do not control for the timing of childbirths and whether they occur at the beginning or at the end of mobility experiences. Secondly, it uses retrospective data which do not provide information about past attitudes and intentions and may be biased by selective or missing retention. Thirdly, it uses a rather small sample of highly mobile people that does not allow us to analyse in details the full diversity of mobility histories (e.g. interrupted mobility experiences).

To deal with this complexity, further research exploring the link between spatial mobility and family development is needed. Future studies should employ larger cross-national datasets to (i) consider the full complexity of mobility histories; (ii) disentangle the causal mechanisms between work-related spatial mobility and fertility behaviours over the lives of men and women; and (iii) analyse the role of regional factors (e.g. unemployment rate; East vs. West Germany).

Despite these limitations, our study is the first to highlight the interrelationship between work-related spatial mobility histories and fertility in a cross-national context. The findings are more nuanced than cross-sectional and single event-based analyses suggest and reveal a complex relationship between mobility experiences and fertility behaviours depending on gender, the form of mobility and the national context. The results suggest that it is important to rethink institutions regarding how spatial mobility can be integrated into the lives of individuals and households. In particular, more research is needed to deduce appropriate policy implications that meet the unique needs of mobile individuals and their families.

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Appendix

Table A5: Poisson regressions of number of children on mobility patterns, by country – men

	Germany		France		Spain		Switzerland	
	Exp(B)	p	Exp(B)	p	Exp(B)	p	Exp(B)	p
Mobility history (ref.=mean)								
History 1	**1.031**	**0.006**	1.063	0.693	1.113	0.364	**1.256**	**0.007**
History 2	0.936	0.694	**1.396**	**0.044**	1.295	0.449	0.883	0.189
History 3	1.077	0.565	0.984	0.920	1.048	0.624	1.161	0.091
History 4	a	a	0.743	0.667	0.755	0.216	a	a
History 5	0.776	0.104	0.986	0.939	0.984	0.928	0.837	0.303
History 6	1.017	0.922	0.934	0.732	0.892	0.356	0.977	0.880
Educational level (ref.= tertiary or more)								
Lower secondary or less	0.845	0.337	0.915	0.473	0.755	0.173	1.079	0.461
Upper secondary	1.093	0.645	0.877	0.257	0.853	0.398	**1.467**	**0.065**
Age (years)	**1.031**	**0.006**	**1.025**	**0.049**	1.009	0.315	0.992	0.382
Constant	0.330	0.057	0.614	0.462	1.199	0.710	2.289	0.072
LR chi² (df) / prob > chi²	10.905(7)/.143		9.056(8)/.338		4.627(8)/.797		4.622(7)/.706	
Log-Likelihood	-179.070		-193.962		-182.930		-185.687	
AIC/BIC	374.139/375.414		405.925/431.593		383.861/409.806		387.374/410.252	
N	122		128		132		129	

Notes: Log-link; robust standard errors; weighted data; a= excluded due to low case numbers; bold face coefficients are significant at p<.05

Table A6: Poisson regressions of number of children on mobility patterns, by country – women

	Germany		France		Spain		Switzerland	
	Exp(B)	p	Exp(B)	p	Exp(B)	p	Exp(B)	p
Mobility history (ref.=mean)								
History 1	1.045	0.703	1.070	0.449	1.061	0.522	1.218	0.060
History 2	**0.443**	**0.031**	0.718	0.070	1.157	0.078	**0.743**	**0.001**
History 3	1.032	0.827	0.949	0.485	0.866	0.120	0.924	0.492
History 4	**1.885**	**0.000**	**1.275**	**0.018**	1.091	0.435	**1.419**	**0.000**
History 5	**0.795**	**0.022**	1.033	0.609	a	a	**0.740**	**0.065**
History 6	**1.396**	**0.029**	1.042	0.653	0.862	0.236	1.139	0.183
Educational level (ref.= tertiary or more)								
Lower secondary or less	1.337	0.276	0.877	0.305	0.876	0.479	0.810	0.093
Upper secondary	0.732	0.381	0.994	0.950	0.902	0.482	1.119	0.500
Age (years)	**1.053**	**0.000**	0.991	0.305	1.022	0.194	0.986	0.200
Constant	0.097	0.002	3.184	0.007	0.730	0.694	3.476	0.015
LR chi² (df) / prob > chi²	40.445(8)/.000		5.489(8)/.712		3.783(7)/.804		9.529(8)/.300	
Log-Likelihood	-189.759		-222.542		-107.801		-197.876	
AIC/BIC	397.519/422.755		463.084/490.059		231.603/250.143		413.753/439.561	
N	122		148		75		130	

Notes: Log-link; robust standard errors; weighted data; a= excluded due to low case numbers; bold face coefficients are significant at p<.05

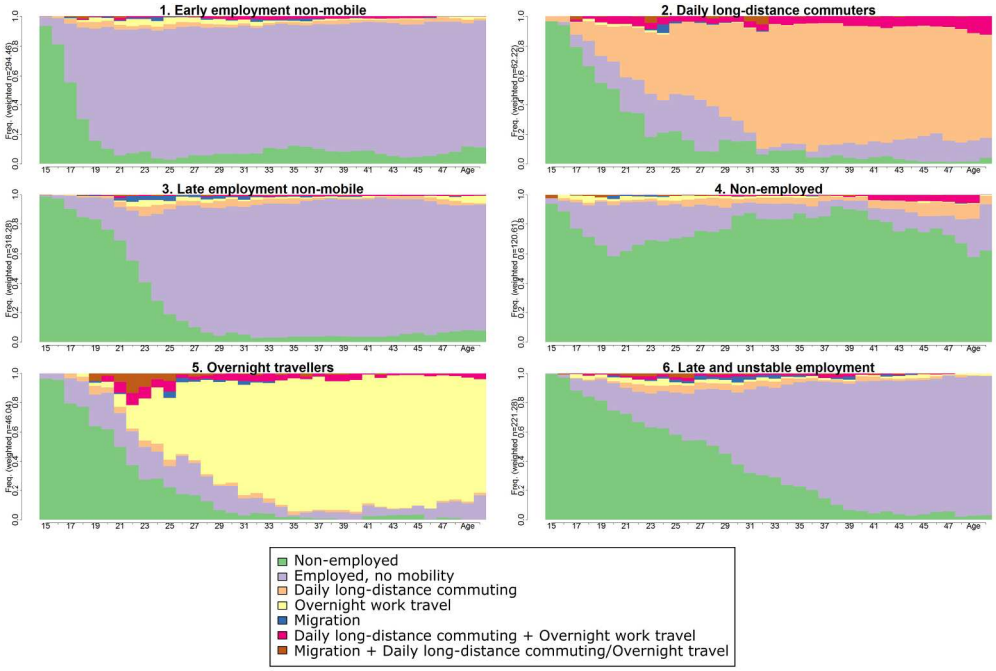

Figure 1: State distribution graphs – whole sample
Reading: At age 30, around 70% of the men and women in the second pattern are highly mobile
Notes: weighted data; N = 1,064

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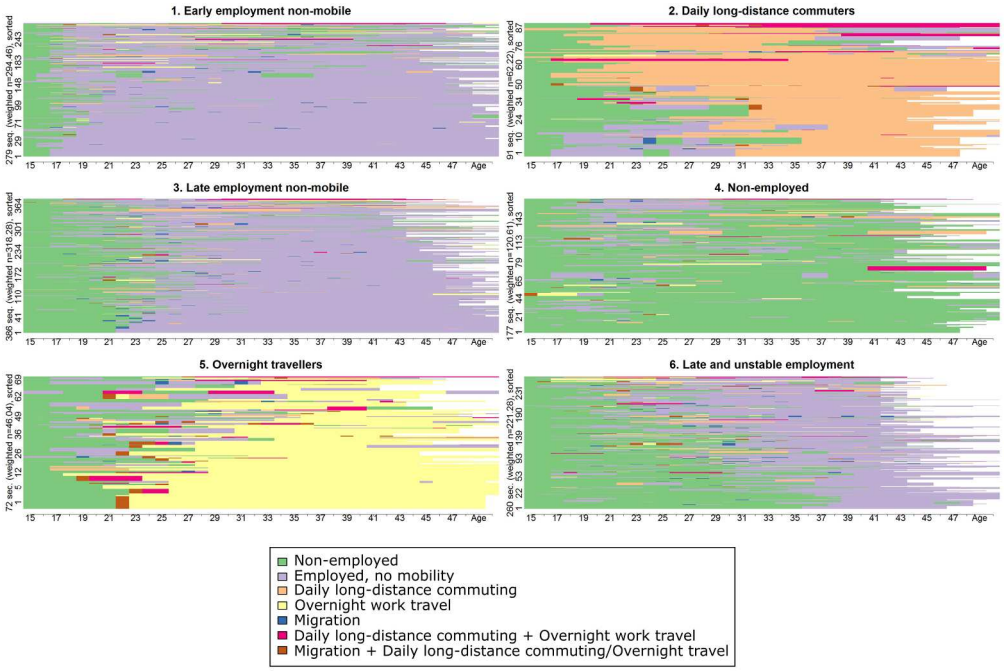

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